

WHAT IS CLAIMED IS:

1. An electron source forming substrate comprising an insulating material film provided on a substrate surface where an electron-emitting device is arranged, wherein said insulating material film contains a metallic oxide and has a vacancy.

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2. The electron source forming substrate according to claim 1, wherein said metallic oxide is an electronically conductive oxide.

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3. The electron source forming substrate according to claim 1, wherein said metallic oxide is SnO₂.

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4. The electron source forming substrate according to any one of claims 1 to 3, wherein said insulating material film has a ratio of said vacancy in its cross section within the range of 5% to 10%.

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5. The electron source forming substrate according to any one of claims 1 to 3, wherein a thickness of said insulating material film is within the range of 150 nm to 3 μm.

25
6. The electron source forming substrate

according to any one of claims 1 to 3, wherein said insulating material film further contains phosphorus.

7. The electron source forming substrate
5 according to any one of claims 1 to 3, wherein the insulating material of said insulating material film is SiO₂.

8. The electron source forming substrate
10 according to any one of claims 1 to 3, wherein on said insulating material film, a film comprising an insulating material is further laminated.

9. The electron source forming substrate
15 according to claim 8, wherein the thickness of the film comprising said insulating material is within the range of 20 nm to 3 μm.

10. The electron source forming substrate
20 according to claim 8, wherein said insulating material is SiO₂.

11. An electron source forming substrate
comprising an insulating material film provided on a
25 substrate surface where a electron emitting device is arranged, wherein said insulating material film

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contains a plurality of metallic oxide particles and vacancy are provided among said plurality of metallic oxide particles.

5 12. The electron source forming substrate according to claim 11, wherein said insulating material film has a ratio of said vacancy in its cross section within the range of 5% to 10%.

10 13. The electron source forming substrate according to claim 11 or 12, wherein the thickness of said insulating material film is within the range of 150 nm to 3 μ m.

15 14. The electron source forming substrate according to any one of claims 11 or 12, wherein said insulating material film further contains phosphorus.

20 15. The electron source forming substrate according to any one of claims 11 or 12, wherein the insulating material of said insulating material film is SiO_2 .

25 16. The electron source forming substrate according to any one of claims 11 or 12, wherein on said insulating material film, a film comprising an

insulating material is further laminated.

17. The electron source forming substrate
according to claim 16, wherein the thickness of the
5 film made of said insulating material is within the
range of 20 nm to 3 μ m.

18. The electron source forming substrate
according to claim 16, wherein said insulating material
10 is SiO_2 .

19. An electron source forming substrate
comprising an insulating material film provided on a
substrate surface where an electron emitting device is
15 arranged, wherein said insulating material film
contains a plurality of metallic oxide particles, said
plurality of the contained metallic oxide particles
form a metallic oxide particle layer between said
substrate surface and said insulating material film
20 surface in said insulating material film, and vacancy
is provided in said metallic oxide particle layer.

20. The electron source forming substrate
according to claim 19, wherein said metallic oxides
25 particle layer has a ratio of said vacancy in its cross
section within the range of 5% to 10%.

21. The electron source forming substrate according to claim 19 or 20, wherein said insulating material film further contains phosphorus.

5 22. The electron source forming substrate according to claim 19 or 20, wherein the insulating material of said insulating material film is SiO_2 .

10 23. The electron source forming substrate according to claim 11 or 19, wherein the average particle size of said plurality of metallic oxide particles is within the range of 6 nm to 60 nm.

15 24. The electron source forming substrate according to claim 11 or 19, wherein the average particle size of said plurality of metallic oxide particles is within the range of 6 nm to 20 nm.

20 25. The electron source forming substrate according to claim 11 or 19, wherein the size of said vacancy is within the range of 0.1 to 5 times the average particle size of said plurality of metallic oxide particles.

25 26. The electron source forming substrate according to claim 11 or 19, wherein the size of said vacancy is within the range of 0.1 to 2 times the

average particle size of said plurality of metallic oxide particles.

27. The electron source according to claim 11 or
5 19, wherein said metallic oxide particles are electronically conductive particles.

28. The electron source forming substrate according to claim 11 or 19, wherein said metallic
10 oxide particles are particles of SnO₂.

29. The electron source forming substrate according to any one of claims 1, 11 or 19, wherein said substrate is a substrate containing sodium.

15 30. The electron source forming substrate according to claim 29, wherein said insulating material film is a sodium blocking film.

20 31. The electron source forming substrate according to any one of claims 1, 11 or 19, wherein said insulating material film is a antistatic film.

25 32. An electron source, comprising a substrate and an electron-emitting device arranged on said substrate, wherein said substrate is the electron

source forming substrate according to any one of claims
1, 11 or 19.

33. The electron source according to claim 32,
5 wherein said electron-emitting device is an
electron-emitting device comprising an conductive film
including an electron-emitting portion.

34. The electron source according to claim 32,
10 wherein a plurality of said electron-emitting devices
are matrix-wired by a plurality of row-directional
wirings and a plurality of column-directional wirings.

35. An image display apparatus comprising an
15 electron-emitting device an image display member for
displaying images by irradiation of electron from said
electron-emitting device and an envelope in which said
electron-emitting device and said image display member
are arranged, wherein a substrate where said electron-
emitting device is arranged are electron source forming
20 substrate according to any one of claims 1, 11 or 19.

36. The image display apparatus according to
claim 35, wherein said electron-emitting devices are
25 electron-emitting devices comprising an conductive film
containing the electron-emitting portion.

37. The image display apparatus according to
claim 35, wherein a plurality of said electron-emitting
devices are matrix-wired by a plurality of row-
directional wirings and a plurality of column-
directional wirings.